

Claims

1-46 (cancelled).

47 (currently amended). A method for removably plugging a wellbore of an oil or gas well to be abandoned, wherein the well defines the wellbore and wherein the method comprises the step of forming a plug within the wellbore, the plug being removable from the wellbore by circulating fluid through the wellbore, in which the plug comprises:

a gel structure comprising at least one crosslinked polymer; and

a swelling agent receptive to substantial hydration, wherein the swelling agent is crosslinked acrylamide sodium acrylate copolymer.

48-58 (cancelled).

59 (previously presented). The method of claim 47 in which the plug is removable by circulation of a fluid selected from the group consisting of water, drilling mud and oil.

60 (previously presented). The method of claim 59 in which the fluid further comprises:

an oxidizing agent.

61 (previously amended). The method of claim 47 in which the plug is removable by circulation of a fluid having an oxidizing agent therein.

62 (cancelled).

63 (previously amended). The method of claim 47 in which the polymer is selected from the group consisting of homopolymers of acrylamide, copolymers of acrylamide and vinyl pyrrolidone, homopolymers of methacrylamide, copolymers of acrylamide and methacrylamide, copolymers of acrylamide and acrylic acid, copolymers of methacrylamide and acrylic acid, terpolymers of pyrrolidone, acrylamide and sodium 2-acrylamido-2-methylpropane sulfonate, copolymers of acrylamide and sodium 2-acrylamido-2-methylpropane sulfonate, water soluble cellulose ether, and mixtures thereof.

64 (previously amended). The method of claim 47 wherein the polymer comprises a mixture of polymers, the mixture comprising:

carboxymethylcellulose having from about a 0.65 to about a 0.95 degree of substitution; and
partially hydrolyzed polyacrylamide having a degree of hydrolysis ranging from about 10 to about 20 percent.

65 (previously amended). The method of claim 47 in which the swelling agent is selected from the group consisting of: homopolymers and copolymers of one or more monomers selected from a group consisting of ethylene oxide, vinyl alcohol, acrylic acid, acrylamide, acrylonitrile, N-vinyl pyrrolidone, 2-hydroxyethylmethacrylate, N-alkylacrylamide, N,N-dialkylacrylamide, mono-N-alkylitconates, gamma-glutamic acid, and L-glutamic acid; and mixtures and gel blends of such homopolymers and copolymers.

66-67 (cancelled).

68 (withdrawn and currently amended). The method of claim 47 wherein the swelling agent is selected from the group consisting of chitosan, pectin, gelatin, amylopectin, k-carrageenan, hyaluronic acid, sulphobetaine, cellulose ethers, starch and mixtures thereof.

69 (previously amended). The method of claim 47 in which the swelling agent is at least partially enclosed in an encapsulation material and wherein the encapsulation material is characterized by the ability to delay the swelling process.

70 (previously presented). The method of claim 69 in which the swelling agent is a synthetic polymer taken from the group consisting of glycolide, poly(acrylate)s, poly(alkyl α -cyanoacrylate) and poly(acrylamide).

71 (previously presented). The method of claim 69 in which the encapsulation material comprises a natural polymer selected from the group consisting of starch derivatives, cellulose derivatives, polysaccharides, chitosan, gelatin and carrageenans.

72-74 (cancelled).